

**Who Seeks and Who Receives?
Implications of Demand for and Access to Financial Capital by Young Firms**

Sheryl Winston Smith
Fox School of Business, Temple University
540 Alter Hall, 1801 Liacouras Walk
Philadelphia, PA 19122
Ph: 215.204.4555
sheryl.winston.smith@temple.edu

Alicia M. Robb
Senior Research Fellow, Kauffman Foundation
University of California, Santa Cruz
arobb@ucsc.edu

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Abstract:

In the aftermath of the latest financial crisis, policy-makers at all levels are concerned about the impact of the crisis on access to financial resources by young firms, particularly as major changes occur in bank-lending practices and uncertainties surround the implementation of financial reform legislation. In this paper, we analyze the types and sources of financing used in young firms over the years 2007 through 2009. We find differential outcomes for firms who applied for loans and received them, those who applied and were denied, and those which did not apply for fear of denial. We explore the factors that mitigate the decision to apply for a loan and the subsequent outcomes of firm survival and growth. Our work provides insights into the relative importance of supply and demand for financing both prior to and subsequent to the financial shocks. We leverage various measures and perceptions to disentangle the decision to seek bank loans from the likelihood of receiving a loan based on credit scores and other objective measures. We find that both tangible and intangible assets, particularly intellectual property, play a significant role in receipt of bank loans in the firms' early years of operation.

Keywords: Entrepreneurial finance, bank loans, financial crisis, credit scoring, behavioral finance

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Introduction

The lack of sufficient starting capital—a crucial resource at startup—is a binding constraint for new firms. The finance literature shows that entry into entrepreneurship increases with sudden increase in personal wealth, e.g. via bequest (Cagetti and De Nardi (2006)) or external change in taxation rate (Nanda (2008)), and with increased access to bank financing through deregulation and loosening of branching restrictions (Black and Strahan (2002)). Likewise, absence of funds inhibits entry. For example, Evans and Jovanovic (1989) find that borrowing capacity limits entrepreneurial entry; using the National Longitudinal Survey they estimate that new entrepreneurs are limited by 1.5 times the size of their initial assets in starting a new business. In this paper, we analyze the use of bank loans in young firms during their early years of existence, and how these are altered in the wake of the financial shocks of 2008. We address two crucial questions: 1) what characteristics of startups—and their founders—are related to seeking and receiving bank credit and 2) how did the financial crisis alter or amplify this dynamic.

This paper exploits rich information regarding the types and sources of financing used in new firms over the first six years of operations in the confidential Kauffman Firm Survey (KFS) microdata, a longitudinal panel study of 4,928 businesses that started in 2004. The baseline survey of new businesses has been followed up with six subsequent annual surveys in an ongoing effort to track the new business trajectories (Ballou, Barton, Desroches, Potter, Reedy, Robb, Shane and Zhao (2008); Reedy and Robb (2009)). Importantly, the most recent survey spanned the financial shocks of 2008 and 2009, which occurred in the fifth and sixth year of operations for the firms in this survey. We probe both material and behavioral drivers of the entrepreneur's decision to apply for bank credit. We then account for the selection bias in the first stage decision to apply in our analysis of ultimate receipt of bank credit. The role of

tangible and intangible assets and financial performance prior to the crisis are explored.

Moreover, we explore the particular relevance of these questions to new high-technology firms. In previous work using the KFS data, Winston Smith (2010) provided evidence that banks increase lending to high-technology firms as information asymmetry and inherent uncertainty surrounding the firm are lessened. While high-tech firms account for a relatively small percent of the sample, they are disproportionately likely to contribute to economic growth through employment, revenue, assets, and innovations. In this paper, we specifically address the impact on high-tech firms relative to firms in low-tech industries.

The findings in this paper provide important insights for the growing policy debate concerning the constrained credit and lending for small businesses, as well as assessing the relative significance of constrained supply and dampened demand. The paper concludes with a discussion of the factors that contribute to young firm survival and growth, including the relative importance of intangible assets, such as intellectual property, and its role in mitigating the consequences of the financial crisis and facilitating economic growth, which have important implications for economic recovery.

From the perspective of the management literature, this paper provides needed detail and insight into the relationship between the resources possessed by the founder at startup and the characteristics that enable and sustain dynamic growth of innovative new ventures. By examining the firm at its founding and in the crucial first five years of life, we are able to add directly to the literature on the resource-based view of the firm, with a focus on the interaction of the financial and behavioral endowments of the founder (Robb and Robinson (2010).

Theoretical Framework

Banks and New Firm Finance

In practice, entrepreneurs rely on a mixture of financing options for new companies,

often employing both informal and formal sources of capital for early financing, including bank loans and venture capital (Bhide (2000); Parker (2009); Shane (2008)). In the aggregate, the financing of small businesses in the United States has been a roughly equal mixture debt and equity (Berger and Udell (1998); Haynes and Brown (2009); Robb and Robinson(2010)).

Banks are the largest source of external debt and insiders the largest source of equity for small firms in the United States (Haynes and Brown (2009); Robb, Reedy, Ballou, DesRoches, Potter and Zhao (2010)). Similar patterns hold in the United Kingdom (Parker (2009)).

Chemmanur, He, and Nandy (2009) find that having outside financing prior to IPO increases the likelihood of going public, and that this result holds for both venture capital and bank financing.

Banks overall play a substantial role in new firm formation and growth (Ayyagari, Demirguc-Kunt and Maksimovic (2010); Beck, Demirgüç-Kunt and Maksimovic (2008); Kerr and Nanda (2009)). Black and Strahan (2002) show that deregulation of interstate banking and loosening of branching restrictions fostered increased entrepreneurial activity. In a sample of Italian firms, Benfratello, Schiantarelli, and Sembenelli (2008) find that bank loans facilitate innovation. In a sample of French firms, (Landier and Thesmar (2009)) find that banks provide entrepreneurs with short-term and long-term debt.

Importantly, debt financing places the risk associated with the new firm squarely with the entrepreneur, who must repay regardless of outcome; equity financing spreads the risk between the entrepreneur and the investor but also dilutes the owners' control (Jensen and Meckling (1976)). Equity financing smoothes the financial cost of potential failure, while debt financing amplifies it. However, the entrepreneur may be averse to giving up an equity stake and control, preferring instead to obtain non-dilutive debt financing. For example, recent evidence suggests a growing use of external debt by very young firms, with significant differences among firms in high-technology industries compared with other industries. (Coleman and Robb (2009); Robb

and Robinson(2010)).

Information asymmetry and uncertainty in new firm financing

Significant principal-agent conundrums arise in financing new ventures due to information asymmetry, moral hazard, and adverse selection. The literature on entrepreneurial finance identifies specific features of contracting and allocation of rights as a crucial mechanism for aligning interests under circumstances of information asymmetry and uncertainty. Adverse selection arises when the entrepreneur knows her own ability while the outside investor does not. Amit, Glosten, and Muller (1990) model the relationship between information asymmetry and outside financing. Their model suggests that under conditions of information asymmetry outside investors are more likely to be presented with lower quality entrepreneurs, as higher quality entrepreneurs will choose to proceed alone. Analyzing contracts between venture capitalists and portfolio companies, Kaplan and Stromberg (2003) find that cash flow rights and control rights are allocated separately, and are made contingent upon observable performance measures. Contingencies are included for financial performance, non-financial performance, and milestones. Allocation of different types of rights and specification of contingencies are used as complements. They also find a strong preference for convertible preferred stock among the contracts studied. In a separate paper, the same authors further associated specific risks with particular contractual terms (Kaplan and Stromberg (2004)). Specifically, they find that venture capitalists are given greater control rights under conditions of greatest information uncertainty between the entrepreneur and the investor. Moral hazard is introduced both when the entrepreneur's effort cannot be monitored and when the investor's commitment cannot be assured. Schmidt (2003) finds that such double moral hazard situations are ameliorated through the use of convertible securities in venture capital contracts. Casamatta (2003) likewise models the use of convertible bonds and preferred equity in aligning interests in VC contracts. She

models an entrepreneur who seeks money and advice and a VC who can provide both, compared to “consultants” able to provide advice but not funding. In this circumstance, both entrepreneur and VC must exert effort, which is unobservable, and incentives are aligned through commensurate allocation of cash flow rights. Hellman (2006) models the role of convertible preferred securities in allocating cash flow rights contingent upon exit strategy, i.e. acquisition or IPO.

One key strand within the literature on entrepreneurial finance addresses the preference for debt versus equity financing. In broad terms, the entrepreneur prefers to maintain control rights but generally faces capital constraints, while the investor seeks the highest return for a given level of risk. Importantly, debt financing and equity financing (bank loans compared to venture capital) have different implications for entrepreneurs (Schmidt (2003); Ueda (2004)). Plausible theoretical arguments can be made in favor of the entrepreneur preferring debt financing in order to secure adequate funds while retaining full control rights (Berger and Udell (1998)). However, economic theory also suggests the entrepreneur will prefer to smooth risk by avoiding the necessity to make fixed payments if the firm does not do well, suggesting preference of equity over debt financing.

Inherent information asymmetry makes it difficult for banks to evaluate young firms, particularly in high-technology industries due to the lack of tangible assets and concurrent reliance on knowledge assets, as well as technical and market uncertainty. Banks face greater liquidity constraints than VC firm, leading to preference for collateral, transparent valuation, and other lower risk sectors (Berger and Udell (1998); Ueda (2004); Winton and Yerramilli (2008)). The information asymmetries associated with new, high tech firms make traditional bank lenders less likely to lend to these firms. Empirical studies support this finding broadly (Cole (2008); Cosh, Cumming and Hughes (2009)). Hellman, Lindsey, and Puri (2008) find that banks use

strategic equity investing, i.e. venture capital, to build subsequent banking relationships. Banks use relationship building and the gathering of “soft” information to mitigate information asymmetry.

At the same time that young firms may be hit hardest by financial crisis, these firms may also have the highest resource needs. Bradley *et. al.* (Bradley, Aldrich, Shepherd and Wiklund (2011) find that environmental jolts require greater resource seeking in young firms as they lack financial slack. Moreover, if the lack of reputation or perception of lack of creditworthiness is internalized the founder becomes underconfident (Hayward, Rindova and Pollock (2004)).

Taken together, the arguments above lead us to develop our first hypothesis:

Hypothesis 1: In times of financial crisis, behavioral characteristics associated with lack of confidence will lead to founders not applying for bank loans.

The effects of information asymmetry will be heightened in times of crisis. The lack of reputation particularly harms young firms in debt markets (Diamond (1989)). Negative macroeconomic events at founding or in the early years of firm life disproportionately increase the failure rate of young firms (Geroski, Mata and Portugal (2010)). Moreover, Geroski *et al.* find support for the ideas that initial resources have a lasting effect on new firm survival and that firms are essentially imprinted by their founding conditions; thus early negative events have a persistent impact.

Financial crises can also precipitate a flight to quality by lenders (Caballero and Krishnamurthy (2008); Naes, Skjeltorp and Odegaard (2011)). Taken together, these arguments lead us to develop our second hypothesis:

Hypothesis 2: In times of financial crisis, banks will be less likely to lend to more informationally opaque firms.

Data description and summary statistics

Kauffman Firm Survey (KFS)

A new panel microdataset is used to explore the types and sources of financing used in new firms at the start and over time. The Kauffman Firm Survey (KFS) is a longitudinal panel study of 4,928 businesses founded in 2004 and tracked over their early years of operation. The panel structure of the data covers the first six years of operation of the firm, and thus the results provide critical insights into how firms are financed in their early years of operation, and the relationship between financing and subsequent outcomes. Detailed data are gleaned on the nature of new business formation activity including internal and external sources of financing, firm size and focus, and data related to the characteristics, experience and human capital and of the entrepreneur (Ballou, Barton, Desroches, Potter, Reedy, Robb, Shane and Zhao (2008); Reedy and Robb (2009)). Data were collected in the baseline survey of new businesses started in 2004, and subsequent annual surveys. The businesses in this sample all came into existence in 2004, with business start defined in terms of state unemployment insurance paid, FICA, Schedule C income reported on personal income tax, EIN, or the presence of legal status.

The KFS data are based on a large sample of a wide spectrum of industries, oversampled on high-technology to insure the inclusion of sufficient numbers in the sample. Firms are oversampled with known weights, allowing econometric approaches to account for clustered errors arising from stratified sampling (Wooldridge (2002)). The breadth of industry inclusion and flexibility in measuring high-technology industries enable us to gather insights into the dynamic relationship between financing and innovation in industries where innovation is most likely.

These data offer additional advantages for examining new firm financing and testing the relationship between initial financing choice and the subsequent innovation trajectory of the

firm. First, many studies of new firms are innately subject to survivor bias when studies are limited to firms that receive particular forms of financing, such as venture capital or even angel financing, in which not all firms survive long enough to reach that point, or studies of firms that go public, which must by necessity have survived long enough to issue public securities. In the KFS data firms all began operations in 2004, and thus the sample does not suffer from inherent survivor bias. The inclusion of a range of industries facilitates comparison between and among distinct types of sectors. Multiple levels of sensitivity to industry differences are considered here. The U.S. Bureau of Labor Statistics and the National Science Foundation provide guidelines for categorizing technology-generating and technology-employed industries (Hecker (2005)).

Summary statistics

Many of the variables of interest, such as loan application outcomes and fear of being turned down are only available beginning in 2007. Thus, we have this information only for those firms that started in 2004 and survived until at least 2007. In the appendix, we compare the sample characteristics of all firms in 2004, broken out by whether or not they survived until at least 2007, in terms of owner characteristics, firm characteristics, and financial capital investments. While there are some differences, we note that the two groups are remarkably similar.

Summary statistics for the sample we analyze in the multivariate models are presented in Table 1, as well as for non-high-tech and high-tech only firms. Key outcome variables are summarized in Panel A. About 12% of firms in the sample applied for a new loan in each of the three years under observation; the percent was higher for young high-tech firms (15-16%). In the full sample, between 60 and 70% of loan applicants were always approved; the approval rate was lower for high-tech firms (52-60%), especially in the first two years. Interestingly, the

percentage always approved rose nearly 10 percentage points over the three period for high tech firms, while the percentage declined more than 10 percentage points for non-high tech firms.

The variables describing behavioral characteristics are of particular interest in this study, as these may be important determinants of demand for and access to credit. These variables are summarized in Panel B. The variable *fear of denial* takes a value of 1 when firm owners decided not to seek a new loan at some point when they needed credit for fear of having their loan application turned down. High-tech firms have a slightly lower average for this variable, but the percentage rose over the three years for both high tech firms and firms overall. While just over half of all firms had high credit scores, the percentage was more than 60% for high tech firms.

Owner and firm characteristics are summarized in Panel C and Panel D, respectively. Comparing high-tech firms with non-high-tech firms, the table shows that high-tech firms have a lower representation of female owners and have more educated owners with greater industry and startup experience. Relative to other firms, high-tech firms are more often organized as corporations, and are more likely to be located in metropolitan areas rather than rural areas. Not surprisingly, high tech firms also are more likely to have intellectual property (patents, trademarks, or copyrights) and to have a larger share of employees working in R&D.

Empirical Approach

Our model draws on standard assumptions in the banking literature (Gorton and Winton (2003)). We model the decision to apply for a bank loan in year t as a function of growth prospects and degree of credit/liquidity constraint as well as control variables for industry, firm size, and owner characteristics (Chava and Purnanandam; Edelstein (1975)). We are further interested in the role of information asymmetry in mediating the loan application and approval process. We proxy for information asymmetry in several ways. Particularly for a new firm, having a credit rating inherently reduces the information asymmetry between loan applicant and

lender (Gorton and Winton (2003)). We use the Dun & Bradstreet credit score to credit a dummy variable for high creditworthiness and include this as a predictor of applying for a loan as well as the loan application outcome. The credit score provides significant information to the lender about the creditworthiness of the applicant, thereby reducing the information asymmetry dramatically.

Asset tangibility also plays a role in bank lending decisions. We follow a growing interest in the role of intellectual property in bank lending decisions (Winston Smith (2010)). We include controls for firm and owner characteristics that have been shown to affect likelihood of bank borrowing in the previous literature. Firm characteristics include industry, legal form of ownership, and team ownership. Owner characteristics include race, ethnicity, gender, and age. We also include measures of the owners' human capital, including education, years of prior industry experience, and prior startup experience.

Finally, we are interested in trying to dissect financial and behavioral aspects of the loan process. To this purpose we characterize *loan demand* as a function of observable financial and performance measures (extent of credit constraint primarily, profit/revenue in previous year) and a function of behavioral characteristics (risk, fear of denial).

The equation for who applies for a loan, S , can be expressed as a function of the following characteristics:

$$S = \beta_0 + \beta_j growth + \beta_k constrained + \beta_l behavioral + \beta_x firm + \beta_y entrepreneur + \varepsilon \quad (1)$$

The second stage equation for likelihood of the loan being approved, A , can be expressed as a function of the following characteristics:

$$A = \delta_0 + \delta_1 growth + \delta_2 asymmetry + \delta_3 growth + \delta_4 entrepreneur + \mu \quad (2)$$

Comparing equation 1 and equation 2 above we see that the decision to apply for a loan can be identified through the measures of credit or liquidity constraint and the likelihood of

approval can be identified through the degree of information asymmetry between the entrepreneur and the lender.

In our empirical approach we first estimate separate maximum likelihood probit regressions on the probability of applying for a loan and the probability of receiving a loan. We then carry out two-stage analysis taking into account that individuals first decide whether or not to apply for a loan and then estimate the likelihood of approval, conditional on the decision to apply. Results are described below and summarized in Tables 2-4.

Results

Probit analysis

Table 2 presents the results of a probit model estimating the determinants of the choice to apply for a new loan. The first column presents the results for the three years of pooled data (2007, 2008, and 2009) for high tech firms only, while columns 2 and 3 present results the pooled data for firms from all industries. Column 3 includes interactions of some of the independent variables with high tech status. Across the board, firms that had negative expectations of receiving a loan were more likely to apply for a new loan. There was no difference between high tech firms and firms overall.

The demographic characteristics that had the largest impact of the choice to apply for a new loan are whether the owner had a college degree (for all firms) and previous startup experience (for high tech firms). Previous access to financing through trade credit is also a significant determinant of loan demand. Having a business credit line was also important, while having a business credit card was important for just high tech firms. Interestingly, credit score does not seem to play a role in the likelihood of applying for a new loan. In terms of firm size, overall employment had a positive relationship in loan applications for high tech firms, while the share of R&D employment had a negative relationship. Assets were positively associated with

loan applications for firms overall.

In terms of intellectual property, its presence was negatively associated with loan applications, but it was not statistically significant. However, when the presence was interacted with the flag for being in a high tech industry, the coefficient on the interaction term was negative and statistically significant, indicating that high tech firms with intellectual property were less likely to apply for loans controlling for other factors. There were no differences between years in the likelihood of applying for a new loan, controlling for other factors.

Table 3 presents the results from a similar set of analyses looking at whether the firm's application for loan was denied or approved. Across all specifications we see that fear of being rejected is a strong predictor of being denied a loan. Firms in high tech industries were also more likely to have their loan applications denied. One unexpected result is the negative coefficient on *startup experience* ($p < .01$). A possible interpretation of this result is that previous startup experience may have resulted in business closure or failure, which is not captured in the survey but is likely known to banks. Logically, having started a business that failed in the past might lead to lower likelihood of new loan approvals. Interestingly, the coefficient on *high credit score* is not statistically significant alone, but is positive and highly significant when interacted with the dummy variable for high tech industries, suggesting that the information revealed through verified creditworthiness is particularly valuable in the context of informationally opaque firms, which is often inherent in high-tech industries. Having intellectual property was negatively associated with loan approvals, but the effect was no longer statistically significant when allowed to vary by high tech status. The ratio of R&D employment to total employment and the ratio of insider financing to total financing were also negatively associated with loan approvals. That latter finding might indicate firms are tapping internal resources as well as friends and family to meet their financing needs.

Having a business credit card is associated with lower likelihood of approval, while having a business line of credit is positively related to the likelihood of approval. Taken together, these several variables suggest a nuanced relationship between degree of credit constraint and the types of alternative credit available to a new firm.

Two-stage analysis

In the two-stage analysis we predict the likelihood of loans being approved, conditional on selection into applying for a loan. We estimate a maximum likelihood probit model with a Heckman sample selection correction in the first stage. In all models our first stage selection equation includes a subjective measure and an objective measure. Both the behavioral variable, *fear of denial*, and the existing loan ratio, *bankloan_ratio*, are positive and statistically significant in the first stage selection equation, indicating the appropriateness of these choices.

Controlling for this selection bias reveals additional nuances in our results along several dimensions. Our findings on credit score continue to suggest that the information revealed through verified creditworthiness is particularly valuable for firms in high-tech industries. Yet, the coefficients on intellectual property and the interaction of high-tech and intellectual property are now negative and statistically significant. For high tech firms, having business credit cards, trade credit, and/or business credit lines are negatively associated with having their loan application approved. In addition, their reliance on internal funding is also negatively associated with having their loan application approved. Only credit score was positive and statistically significant in the model with just high tech firms, indicating the potential difficulty of overcoming information asymmetries that are frequently present in these informationally opaque firms.

Firms in the high tech industries appeared to fare worse than non-high tech firms, except

in the case of high tech firms that had high credit scores. Firms with higher levels of R&D spending, at least in terms of employment, also tended to fare worse during this period. The coefficients on the year dummies for 2008 and 2009 were negative and statistically significant in column 3, indicating that tightened credit markets continued to persist.

We also see evidence for the contraction of credit markets in the overall financing patterns of these young firms. In Appendix 2, we can see that the ratio of formal debt financing as a share of financial injections is rising each year to a peak of 70% in 2007. This drops dramatically in 2008, as owners end up contributing more of their own funds into the business. The overall level of financial injections also shows a dramatic drop in 2008, but it appears formal debt financing and levels of new financial injections rebound somewhat in 2009.

Discussion and Policy Implications

From these results we see that a nuanced relationship exists between the young firms' access to financial resources and key characteristics of the entrepreneur, the firm, and capital constraints within the context of a turbulent economy. This work has important implications for policy and policymakers at all levels. In particular, given the role of young firms and entrepreneurs in job creation and economic growth, policymakers need to consider ensure that entrepreneurs and credit worthy firms are able to secure adequate financial resources for growth and success. In addition, this work provides policy makers additional insight into young technology-based firms, which are important contributors to the U.S. economy. Securing funding for new technology-based firms is particularly problematic, however, since many such firms are built upon intellectual capital rather than on physical assets, so it is difficult to determine the value and prospects of the firm. Ensuring these firms have adequate access to

financial capital will enable them to continue to drive innovation, growth, and job creation in the U.S. economy.

| | All | | | High-Tech | | | Non-High Tech | | |
|--|-------|-------|-------|-----------|--------|--------|---------------|-------|-------|
| | 2007 | 2008 | 2009 | 2007 | 2008 | 2009 | 2007 | 2008 | 2009 |
| Panel A: Outcomes | | | | | | | | | |
| Applied for New Loan | 12.0% | 12.5% | 12.1% | 15.7% | 15.1% | 15.8% | 11.8% | 12.4% | 11.8% |
| Always Approved for Loan | 70.7% | 66.4% | 60.9% | 51.6% | 58.4% | 60.5% | 72.3% | 67.1% | 60.9% |
| Revenue (millions) | 0.48 | 0.55 | 0.57 | 0.46 | 0.65 | 0.70 | 0.48 | 0.54 | 0.56 |
| Profit (millions) | 0.02 | 0.05 | 0.02 | -0.26 | -0.04 | 0.01 | 0.04 | 0.05 | 0.02 |
| Panel B: Behavioral Characteristics | | | | | | | | | |
| Did not apply out of Fear | 15.6% | 18.5% | 21.0% | 13.6% | 17.9% | 18.2% | 15.7% | 18.6% | 21.2% |
| High Credit Score | 52.8% | 53.0% | 53.0% | 61.8% | 62.2% | 62.2% | 52.3% | 52.4% | 52.4% |
| Panel C: Owner Characteristics | | | | | | | | | |
| Black | 8.7% | 8.7% | 8.7% | 9.5% | 9.5% | 9.5% | 8.7% | 8.7% | 8.7% |
| Female | 30.6% | 30.6% | 30.6% | 15.3% | 15.3% | 15.3% | 31.6% | 31.6% | 31.6% |
| Hours Worked by Owner | 42.5 | 42.5 | 42.5 | 42.7 | 42.7 | 42.7 | 42.4 | 42.4 | 42.4 |
| Owner Age | 44.9 | 44.9 | 44.9 | 44.7 | 44.7 | 44.7 | 44.9 | 44.9 | 44.9 |
| College Degree or Higher | 48.6% | 48.6% | 48.6% | 72.2% | 72.2% | 72.2% | 47.2% | 47.2% | 47.2% |
| Work Experience | 43.8% | 43.8% | 43.8% | 60.1% | 60.1% | 60.1% | 42.8% | 42.8% | 42.8% |
| Previous Startup | 42.4% | 42.4% | 42.4% | 47.3% | 47.3% | 47.3% | 42.1% | 42.1% | 42.1% |
| Panel D: Firm Characteristics | | | | | | | | | |
| Comparative Advantage | 61.6% | 61.6% | 61.6% | 70.6% | 70.6% | 70.6% | 61.1% | 61.1% | 61.1% |
| Product | 51.0% | 51.0% | 51.0% | 50.9% | 50.9% | 50.9% | 51.0% | 51.0% | 51.0% |
| Home base | 49.3% | 49.3% | 49.3% | 53.4% | 53.4% | 53.4% | 49.1% | 49.1% | 49.1% |
| High Tech | 5.6% | 5.6% | 5.6% | 100.0% | 100.0% | 100.0% | 0.0% | 0.0% | 0.0% |
| Multiple Owners | 52.3% | 57.9% | 60.7% | 52.6% | 57.9% | 59.8% | 52.3% | 57.9% | 60.7% |
| Incorporated | 21.4% | 18.7% | 16.9% | 28.7% | 27.6% | 25.8% | 21.0% | 18.2% | 16.4% |
| Rural | 16.5% | 16.5% | 16.5% | 9.7% | 9.7% | 9.7% | 16.8% | 16.8% | 16.8% |
| PPE/Asset Ratio | 34.5% | 35.1% | 34.9% | 27.2% | 25.3% | 23.9% | 34.9% | 35.8% | 35.7% |
| RD Emp/Emp Ratio | 11.1% | 9.1% | 8.2% | 13.4% | 14.3% | 14.2% | 11.0% | 8.8% | 7.9% |
| Trade Credit | 54.1% | 57.3% | 57.4% | 48.8% | 52.4% | 49.5% | 54.4% | 57.6% | 57.9% |
| Log(Emp) | 0.841 | 0.824 | 0.797 | 0.938 | 1.052 | 0.947 | 0.834 | 0.809 | 0.787 |
| Log(Assets) | 0.115 | 0.105 | 0.099 | 0.109 | 0.108 | 0.117 | 0.115 | 0.104 | 0.098 |
| Insider Financing/Total Financing Ratio | 6.4% | 5.8% | 6.5% | 4.8% | 3.2% | 7.1% | 6.5% | 5.9% | 6.4% |
| Has Business Credit Card | 14.8% | 15.0% | 13.2% | 11.4% | 12.7% | 14.2% | 14.9% | 15.1% | 13.1% |
| Has Business Credit Line | 6.2% | 7.0% | 6.0% | 8.6% | 9.0% | 8.4% | 6.1% | 6.9% | 5.9% |
| Has Intellectual Property | 14.6% | 11.6% | 10.7% | 23.9% | 22.6% | 22.8% | 14.1% | 10.9% | 10.0% |
| Obs | 4122 | | | 540 | | | 3582 | | |
| Source: Kauffman Firm Survey Microdata | | | | | | | | | |

Table 2. New Loan Applications

This table reports coefficient estimates from multinomial probit regressions. The dependent variable in all columns is a dummy variable equal to 1 if the entrepreneur applied for a new loan in the specified calendar year and 0 otherwise. Column 1 includes 2007, 2008, and 2009 for high tech firms only, while Columns 2 and 3 are firms from all industries. Column 3 includes interactions with *high-technology industry*. All columns include entrepreneur, firm, and industry controls. Standard errors (in parentheses) are survey-weighted and heteroskedasticity robust. Significance is denoted as: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

| VARIABLES | High Tech Firms Only | All Firms | All Firms |
|-----------------------------------|----------------------|----------------------|----------------------|
| Fear of Denial | 0.471** (0.218) | 0.288*** (0.0795) | 0.281*** (0.0837) |
| High Tech Industry | | 0.173 (0.118) | 0.0406 (0.221) |
| High TechX Fear of Denial | | | 0.302 (0.232) |
| Intellectual Property | -0.139 (0.176) | -0.0563 (0.0812) | -0.0187 (0.0868) |
| High Tech X Intellectual Property | | | -0.403* (0.214) |
| College Degree or Higher | 0.144 (0.215) | 0.179** (0.0730) | 0.191*** (0.0732) |
| Previous Startup Experience | 0.533*** (0.184) | 0.0644 (0.0687) | 0.0565 (0.0691) |
| High Credit Score | 0.286 (0.194) | 0.0253 (0.0699) | 0.00529 (0.0731) |
| High Tech X High Credit Score | | | 0.290 (0.217) |
| R&D Employment | -0.557** (0.266) | 0.0479 (0.0959) | 0.0450 (0.0969) |
| Trade Credit | 0.588*** (0.182) | 0.414*** (0.0732) | 0.410*** (0.0737) |
| Log of Employment | 0.296** (0.123) | 0.0632 (0.0410) | 0.0671 (0.0412) |
| Log of Assets | -0.263 (0.293) | 0.243** (0.0967) | 0.216** (0.0978) |
| Has Business Credit Card | 0.563*** (0.189) | 0.0838 (0.0699) | 0.0872 (0.0701) |
| Has Business Credit Line | 0.299 (0.211) | 0.776*** (0.0790) | 0.775*** (0.0794) |
| Year Dummy: 2008 | 0.113 (0.207) | -0.0489 (0.0800) | -0.0585 (0.0806) |
| Year Dummy: 2009 | 0.104 (0.203) | -0.0141 (0.0797) | -0.0111 (0.0800) |
| Constant | -4.455** (1.737) | -1.459*** (0.494) | -1.396*** (0.498) |
| Owner Demographic Controls | Y | Y | Y |
| Firm Char. Controls | Y | Y | Y |
| Industry Fixed Effects | Y | Y | Y |
| Observations | 469 | 3280 | 3259 |

Table 3. Loan Application Always Approved

This table reports coefficient estimates from multinomial probit regressions. The dependent variable in all columns is a dummy variable equal to 1 if the entrepreneur's loan applications were always approved and 0 if any applications were denied. Column 1 includes high-tech firms only for 2007, 2008, and 2009. Columns 2 and 3 are for all firms. Column 3 includes interactions with *high-technology industry*. All columns include entrepreneur, firm, and industry controls. Standard errors (in parentheses) are survey-weighted and heteroskedasticity robust. Significance is denoted as:*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

| VARIABLES | High Tech Firms Only | All Firms | All Firms |
|--|----------------------|----------------------|----------------------|
| Fear of Denial | -1.165*** (0.386) | -2.170*** (0.187) | -2.221*** (0.209) |
| High Tech | | -0.259 (0.272) | -1.225** (0.490) |
| High Tech X Fear of Denial | | | 0.781* (0.456) |
| Previous Startup Experience | 0.491 (0.451) | -0.351** (0.163) | -0.395** (0.166) |
| High Credit Score | 0.963** (0.393) | 0.0634 (0.177) | -0.0404 (0.195) |
| High Tech X High Credit Score | | | 1.348*** (0.484) |
| Intellectual Property | -0.254 (0.432) | -0.320* (0.182) | -0.328 (0.201) |
| High Tech * Intellectual Property | | | -0.479 (0.429) |
| R&D Employment | -0.0677 (0.579) | -0.406** (0.203) | -0.409* (0.210) |
| Trade Credit | -0.730 (0.451) | 0.126 (0.170) | 0.109 (0.171) |
| Log of Employment | 0.0924 (0.206) | -0.0112 (0.101) | 0.000337 (0.104) |
| Log of Assets | -0.913* (0.500) | -0.0923 (0.144) | -0.0849 (0.147) |
| Inside Financing/Total Financial Capital | -3.960*** (1.412) | -0.905*** (0.341) | -0.912*** (0.345) |
| Has Business Credit Card | -0.529* (0.311) | -0.313* (0.168) | -0.316* (0.171) |
| Has Business Credit Line | -0.535 (0.335) | 0.413** (0.167) | 0.413** (0.169) |
| Year Dummy: 2008 | 0.192 (0.393) | -0.332* (0.197) | -0.374* (0.201) |
| Year Dummy: 2009 | 0.0601 (0.395) | -0.311 (0.198) | -0.324 (0.203) |
| Constant | 10.12* (5.342) | 1.043 (1.374) | 1.303 (1.409) |
| Owner Demographic Controls | Y | Y | Y |
| Firm Char. Controls | Y | Y | Y |
| Industry Fixed Effects | Y | Y | Y |
| Observations | 101 | 606 | 602 |

Table 4. Loan Application Approval (2 stage)

This table reports coefficient estimates from two-stage Heckprobit regressions with selection correction. The dependent variable in the first stage is a dummy variable equal to 1 if the entrepreneur applied for a new loan and 0 otherwise. The dependent variable in second stage regression is a dummy variable equal to 1 if the loan was approved. Column 1 is years 2007, 2008, and 2009 for high tech firms only. Column 2 and 3 are for all firms. Column 3 includes interactions with *high-technology industry*. All columns include entrepreneur, firm, and industry controls. Standard errors (in parentheses) are survey-weighted and heteroskedasticity robust. Significance is denoted as: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

| VARIABLES | High Tech Firms Only | All Firms | All Firms |
|---|-------------------------|-----------------------|-----------------------|
| First Stage Results | | | |
| Fear of denial | 0.705*** (0.155) | 0.636*** (0.0580) | 0.633*** (0.0580) |
| Bank Loans/Total Financial Capital | 0.708* (0.412) | 0.399*** (0.0760) | 0.394*** (0.0757) |
| Second Stage Results | | | |
| High Tech Industry | | -0.0778 (0.0718) | -0.236** (0.108) |
| Previous Startup Experience | 0.0807 (0.131) | -0.0914** (0.0407) | -0.101** (0.0402) |
| High Credit Score | 0.209* (0.114) | -0.0169 (0.0410) | -0.0512 (0.0434) |
| High-Tech X High Credit Score | | | 0.450*** (0.109) |
| Intellectual Property | -0.143 (0.137) | -0.105** (0.0471) | -0.0910* (0.0501) |
| High Tech X Intellectual Prop. | | | -0.235** (0.106) |
| R&D Employment | 0.0248 (0.220) | -0.127*** (0.0469) | -0.126*** (0.0465) |
| Have Trade Credit | -0.183* (0.100) | 0.0277 (0.0428) | 0.0245 (0.0420) |
| Log of Employment | -0.00783 (0.0609) | -0.0110 (0.0250) | -0.0110 (0.0246) |
| Log of Assets | -0.270 (0.202) | 0.00466 (0.0374) | 0.00624 (0.0381) |
| Insider financing/Total Financial Capital | -0.746** (0.324) | -0.310*** (0.101) | -0.304*** (0.100) |
| Has business credit card | -0.171* (0.0973) | -0.0981** (0.0413) | -0.0940** (0.0412) |
| Has business credit line | -0.173* (0.0943) | 0.106*** (0.0394) | 0.110*** (0.0391) |
| 2008 Year Dummy | 0.0320 (0.0917) | -0.0751 (0.0472) | -0.0803* (0.0472) |
| 2009 Year Dummy | 0.00760 (0.158) | -0.121** (0.0480) | -0.122** (0.0480) |
| <i>athro</i> | 1.156 (1.162) | 1.506*** (0.129) | 1.516*** (0.130) |
| <i>Insigma</i> | -0.734 (0.530) | -0.355*** (0.0552) | -0.366*** (0.0556) |
| Owner Demographic Controls | Y | Y | Y |
| Firm Chareristic Controls | Y | Y | Y |
| Industry Fixed Effects | Y | Y | Y |
| Observations | 605 | 4415 | 4411 |

Appendix 1: Sample (All Firms, Analysis Sample (those that survived until at least 2007), Closed by 2007)

Baseline Data (2004)

| Baseline Data (2004) | | | | |
|--|--|------------|------------|------------|
| | | | | |
| Owner Characteristics | | All Firms | Survivors | Closures |
| Average Hours Worked (week) | | 42.4 | 43.0 | 41.1 |
| Previous Industry Work Experience | | 11.8 | 12.6 | 10.4 |
| Previous Startup Experience | | 42.5% | 43.1% | 41.5% |
| Number of Previous Startups | | 1.0 | 1.0 | 1.1 |
| Owner Age | | 44.9 | 45.3 | 44.4 |
| Black | | 8.8% | 7.9% | 11.1% |
| Asian | | 4.2% | 4.3% | 3.4% |
| Hispanic | | 5.2% | 4.8% | 6.2% |
| Other | | 2.3% | 1.8% | 2.9% |
| White | | 79.7% | 81.2% | 76.2% |
| Female | | 30.5% | 29.5% | 32.5% |
| High School Graduate or Less | | 13.5% | 12.1% | 16.4% |
| Some College | | 36.4% | 35.0% | 37.6% |
| College Degree | | 30.2% | 31.6% | 29.7% |
| Post-Grad Education | | 17.5% | 18.4% | 14.7% |
| Firm Characteristics | | | | |
| Incorporated | | 58.4% | 57.8% | 61.4% |
| Home Based | | 49.4% | 50.3% | 47.6% |
| Comparative Advantage | | 62.6% | 64.1% | 60.9% |
| Intellectual Property | | 19.3% | 20.4% | 16.9% |
| Employer Firm | | 38.3% | 37.5% | 39.9% |
| Employment | | 1.858 | 1.772 | 2.105 |
| High Credit Score | | 12.0% | 13.3% | 8.9% |
| Multi-Owner Firm | | 34.8% | 33.6% | 37.8% |
| Startup Financing | | | | |
| Owner Equity | | 28.2% | 26.2% | 32.8% |
| Insider Equity | | 1.7% | 1.3% | 3.1% |
| Outsider Equity | | 15.7% | 18.0% | 8.0% |
| Owner Debt | | 4.2% | 3.9% | 5.3% |
| Insider Debt | | 5.8% | 5.1% | 7.7% |
| Outsider Debt | | 44.4% | 45.4% | 43.1% |
| Total Startup Capital | | \$ 115,835 | \$ 122,983 | \$ 101,184 |
| Source: Kauffman Firm Survey Microdata | | | | |

| Appendix 2: Startup Capital and Subsequent New Financial Injections (2004-2009) | | | | | | |
|---|------------|-----------|-----------|------------|-----------|------------|
| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| Owner Equity | \$ 32,612 | \$ 16,728 | \$ 12,858 | \$ 10,304 | \$ 10,218 | \$ 8,676 |
| Insider Equity | \$ 1,929 | \$ 1,539 | \$ 846 | \$ 577 | \$ 551 | \$ 833 |
| Outsider Equity | \$ 18,232 | \$ 20,097 | \$ 16,308 | \$ 11,522 | \$ 5,477 | \$ 10,371 |
| Owner Debt | \$ 4,884 | \$ 4,595 | \$ 4,058 | \$ 4,173 | \$ 4,675 | \$ 3,034 |
| Insider Debt | \$ 6,704 | \$ 5,847 | \$ 5,346 | \$ 4,815 | \$ 3,386 | \$ 10,118 |
| Outsider Debt | \$ 51,474 | \$ 47,430 | \$ 54,405 | \$ 73,480 | \$ 47,435 | \$ 75,605 |
| Total Financial | \$ 115,835 | \$ 96,235 | \$ 93,821 | \$ 104,870 | \$ 71,741 | \$ 108,636 |
| | | | | | | |
| Owner Equity | 28.2% | 17.4% | 13.7% | 9.8% | 14.2% | 8.0% |
| Insider Equity | 1.7% | 1.6% | 0.9% | 0.5% | 0.8% | 0.8% |
| Outsider Equity | 15.7% | 20.9% | 17.4% | 11.0% | 7.6% | 9.5% |
| Owner Debt | 4.2% | 4.8% | 4.3% | 4.0% | 6.5% | 2.8% |
| Insider Debt | 5.8% | 6.1% | 5.7% | 4.6% | 4.7% | 9.3% |
| Outsider Debt | 44.4% | 49.3% | 58.0% | 70.1% | 66.1% | 69.6% |
| Total Financial | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| | | | | | | |
| Source: KFS microdata | | | | | | |

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